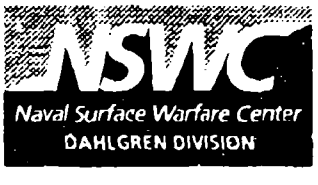
NSWCDD/MP-93/125

ELECTRO-OPTICAL SYSTEMS EVALUATION PROGRAM MASTER PLAN

PREPARED BY
DCS CORPORATION
ALEXANDRIA, VIRGINIA 22314

FOR
SHIP DEFENSE SYSTEMS DEPARTMENT
DAHLGREN, VIRGINIA 22448-5000

MARCH 1993



NAVAL SURFACE WARFARE CENTER
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FOREWORD

This report has been written in response to a project scope defined by the Program Executive Office for Ship Defense (PEO(SD)). This scope involves the evaluation of up to six industry-developed electro-optical systems under the Electro-Optical Systems Evaluation program at the Naval Surface Warfare Center, Dahlgren Division, Dahlgren, Virginia. Should substantive changes in the direction or execution of this plan occur, they will be forwarded under separate cover.

Approved by:

THOMAS C. PENDERGRAFT, Head
Ship Defense Systems Department

The following individuals and/or organizations reviewed and approved this evaluation plan.

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Program Executive Officer - Ship Defense

ABSTRACT

This master plan is to be used as a basis for testing and evaluating to determine whether an electro-optical (E-O) tracking system containing a video tracker, television (TV) (daylight or low light level TV), a laser rangefinder, and a thermal imaging sensor is currently available and suitable for use in a variety of naval applications, including ship defense. The objective is to determine the degree to which an existing, non-developmental item E-O system can be used to support missions of U.S. Navy ships. Test events include air target, surface target, floating target, periscope detection, swimmer detection, man overboard, and additional events of general applicability.

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1.0 INTRODUCTION

1.1 BACKGROUND

There is a recognized need for an improvement of shipboard sensors, particularly for detection and recognition of certain targets. Currently, there is an Electro-Optics Mission Need Statement that describes the need for an electro-optical (E-O) surveillance and tracking capability within the framework of current defense guidance. In addition, there is a Tentative Operational Requirement for a thermal imaging sensor (TIS) that identifies a specific need for a thermal imaging capability for surveillance, target identification, and tracking in support of surface ship missions. It is expected that thermal imaging and television (TV) sensors, combined with video trackers and laser rangefinders, can be used to address these areas. The Electro-Optical Systems Evaluation (EOSE) Program seeks to evaluate existing E-O systems to determine the extent to which these systems can meet evolving U.S. Navy requirements. This includes determining if a replacement system is available for the mast-mounted sight currently deployed on frigate and destroyer class ships. In addition, the EOSE program will afford the United States a unique opportunity to build upon the expertise of contractors and the investment made by their company and customers in system development, test, and integration. As part of the EOSE program, the Naval Surface Warfare Center, Dahlgren Division (NSWCDD) has been tasked by the Program Executive Office for Ship Defense (PEO(SD)), Mr. Joseph Misanin, to conduct a land-based evaluation of up to six E-O systems.

1.2 OBJECTIVES

The primary objective of this evaluation is to determine whether an E-O tracking system containing a video tracker, TV (daylight or low light level TV (LLLTV)), a laser rangefinder, and a TIS is currently available and suitable for use in a variety of naval applications, including ship defense. Basically, the objective is to determine the degree to which an existing, non-developmental item E-O system can be used to support missions of U.S. Navy ships. The specific objectives for this evaluation are found in Section 4.0.

1.3 SYSTEMS TO BE EVALUATED

The systems selected for the evaluation were required to satisfy a set of selection criteria established by NSWCDD with the concurrence of the PEO(SD). Significant selection criteria are

- The candidate systems must include a TIS operating in either or both the 3 to 5 and the 8 to 12-μm bands; an automatic video tracker; a daylight TV, LLLTV, or both; two or more axes of stabilization; and a laser rangefinder.

- General suitability for naval applications must be evidenced by analysis or tests demonstrating resistance to high levels of external electromagnetic interference, the ability to accept an external designation, the ability to output target tracking data to an external system, incorporation of materials and design approach compatible with the marine environment, design and construction consistent with operation and maintenance by electronics technician or fire control technician enlisted-Navy ratings.

- Weight and volume must be consistent with practical above and below decks installation, maintenance, and operation.

1.4 SCOPE

Three industry sensor systems, the mast-mounted sight system, and the EX 46 optical sight system will be evaluated concurrently at the Search and Track Sensor Test Site (STSTS) at NSWCDD. The industry systems to be evaluated were selected based upon industry responses to a Commerce Business Daily request, published in December 1992, for expressions of interest and a questionnaire transmitted to requesting vendors. The evaluation will take place on the schedule set forth in Section 5.0 of this plan. The testing will be conducted in the prevailing weather during the test period, limited only by safe operation of the scheduled targets during a given daily test period. During the evaluation, dynamic air and surface targets, towed air targets, and special-purpose targets will be used to validate specific data points. Although it is not currently anticipated that the ability of the industry systems to function in the presence of ship's motion will be determined experimentally during this evaluation, it is expected that the selected systems have been designed with this capability.

2.0 PARTICIPATING ORGANIZATIONS AND RESPONSIBILITIES

The following organizations will be tasked to provide the support defined in this plan.

2.1 PROGRAM EXECUTIVE OFFICER–SHIP DEFENSE

The PEO(SD) shall act as overall project sponsor for this evaluation. The PEO(SD) will provide funding, oversight, and overall guidance.

2.2 NAVAL SURFACE WARFARE CENTER

2.2.1 General

NSWCDD shall provide technical direction for the evaluation, a suitably configured test area, test targets, and test instrumentation; prepare the plan and the evaluation procedures; conduct all tests associated with the evaluation; and document the test results.

2.2.2 Contracts

NSWCDD shall interact directly with the participating industry vendors for the technical and logistics support required to accomplish this evaluation.

2.2.3 Test Area

NSWCDD shall use its Potomac River Test Range (PRTR) and STSTS for this evaluation. A detailed description of these facilities is found in Section 3.2.

2.2.4 Instrumentation, Data Analysis, Targets, and Supplies

NSWCDD shall arrange for instrumentation for data collection, test targets, non-unique consumable and expendable supplies, data reduction, data analysis, and evaluation reporting. NSWCDD shall be responsible for all data reduction used in

the preparation of NSWCDD evaluation reports. This includes providing all necessary hardware, software, and personnel for both quick-look data review and indepth data reduction.

2.2.5 Equipment Installation and Teardown

NSWCDD shall provide, at no cost to the vendors, suitable crane services to assist in the installation and removal of equipment at the STSTS. In addition, NSWCDD shall have one technician available to assist the vendors with installation and removal of equipment. NSWCDD shall also prepare equipment foundations for the vendors' directors on the STSTS Experimental Test Fixture (ETF) building, and assist with the installation of cables, cooling lines, and other items of vendor-provided equipment that are mutually agreed to in the vendor-provided installation planning documents. Reasonable efforts will be made to *mate* industry equipment to NSWCDD supplied foundations.

2.2.6 Repair Support

NSWCDD shall, at its option, provide limited repair support to the vendors. NSWCDD technicians will be made available, as needed, to assist vendor personnel in accomplishing corrective maintenance actions requiring more personnel than are available in the vendor's on-site team. Requests for crane and rigger support other than that scheduled for installation, teardown, and removal can be arranged upon request to the NSWCDD EOSE Program Manager. Depending upon other demands for crane service and the configuration of the crane needed to provide the requested support, one to two workdays may elapse before unscheduled crane service can be provided. Crane services outside of normal working hours are unlikely, except in cases of extreme necessity. If repairs are made to the systems, a civilian aircraft may be scheduled on relatively short notice by the Test Conductor to verify proper system operation.

2.2.7 Range Control and Range Safety

NSWCDD shall provide all resources required to operate and control the test area during the evaluation. This includes range scheduling, target communications, safety surveillance to detect intruders in the evaluation operations area, issuing any required Notices to Airmen and Mariners, and coordinating with off-station activities that will participate in range surveillance and range control.

2.2.8 Laser Safety

NSWCDD shall develop a laser safety Standard Operating Procedure (SOP) for approval by the NSWCDD Range Safety Director and the NSWCDD Laser Safety Committee. All test activities and vendors shall comply with the safety directives found in Section 8.0. NSWCDD shall be responsible for briefing the vendors on the laser safety directives and providing the necessary protective eyewear to test personnel if required.

2.2.9 Personnel

NSWCDD shall provide sufficient personnel for normal operation of the STSTS on an 8-hr day, 5-day work week basis. NSWCDD shall also provide personnel to support limited-duration, on-demand requirements to meet unexpected weather or equipment delays for either an 8-hr, 7-day work week or an additional 4-hr shift within the 5-day work week. It is expected that the maximum duration of such additional support will not exceed two consecutive weeks nor more than 2 weeks in any 4-week period. The responsibilities of some of the more significant NSWCDD personnel are as follows:

2.2.9.1 EOSE Program Manager. The EOSE Program Manager is the main point of contact for the evaluation and is responsible for project budgeting and scheduling. In addition, the EOSE Program Manager shall have primary responsibility for establishing need-to-know for access to classified data or areas of the test area. The EOSE Program Manager is responsible for providing logistical support such as base escorts, special requests such as extended working hours and photographic services, and distributing the plan and evaluation procedures documents to pertinent personnel involved with range safety, scheduling, instrumentation, and test control.

2.2.9.2 Test Director. NSWCDD shall provide a Test Director who is responsible for maintaining range safety and enforcing NSWCDD policy at the PRTR. As the primary range safety officer, the Test Director shall maintain control of all the laser keyswitch keys for each of the vendors' systems.

2.2.9.3 Test Conductor. The Test Conductor is responsible for the execution of the evaluation in accordance with the approved plan and evaluation procedures. The Test Conductor is subordinate to the NSWCDD Test Director only in areas of range safety and NSWCDD policy. Specific responsibilities of the Test Conductor are as follows:

- Test Execution–The Test Conductor is responsible for conducting a pre-test briefing prior to commencement of testing on each test day, performing the tests in accordance with the approved evaluation procedures, authorizing and fully documenting any

deviation from the evaluation procedures, conducting a posttest debriefing at the conclusion of each test period or the conclusion of each test day, and making sure that a quick-look review of the data has been accomplished and that the test data are properly labeled and stored.

- Configuration Management (CM)–The Test Conductor is responsible for establishing and maintaining configuration control of the hardware and software of the vendors' systems. The configuration shall be fixed at the beginning of the evaluation as each system is declared operational and ready for test by the vendor. Any subsequent changes to the system configuration will require the prior approval of the Test Conductor. The Test Conductor shall make random spot checks of each system to ensure configuration control is maintained. Additional discussion on CM is found in Section 2.4.

- Laser Operation–The Test Conductor is responsible for all laser emissions during the evaluation.

- Repairs–The Test Conductor is responsible for making sure all repair actions made to the vendors' systems during the evaluation are documented.

2.3 VENDORS

The statements in this section apply equally to all industry vendors. Specific responsibilities will be addressed as the vendors are selected.

2.3.1 General

Each vendor shall provide complete supporting hardware, software, documentation, spares, and personnel as required to participate in this evaluation. The vendors will comply with all NSWCDD safety, security, and operational policies and directives during pre-test equipment installation and checkout, informal and formal testing, and equipment removal. All vendor activities will be under the direct control of the NSWCDD Test Conductor.

2.3.2 Personnel

2.3.2.1 Configuration Manager. Each vendor shall designate a single individual (normally their on-site team leader) as their Configuration Manager. The Configuration Manager is responsible for establishing the system's initial

configuration, obtaining prior approval for any changes in configuration from the NSWCDD Test Conductor, and ensuring configuration control is maintained. In addition, the Configuration Manager will be responsible for reporting all maintenance actions to the NSWCDD Test Conductor.

2.3.2.2 System Operator. Each vendor shall provide a qualified and trained system operator who shall operate the system during all formal testing. NSWCDD personnel may request to operate the equipment during non-test periods under the guidance of vendor personnel to gain operational experience and to aid in the evaluation of overall system suitability for U.S. Navy applications.

2.3.3 Containers

The vendors shall provide their own enclosed containers for housing all below-deck equipment and to satisfy the vendors' office and storage space requirements.

2.3.4 Laser Safety Switches and Cutouts

Each vendor shall implement a key-operated laser firing inhibit switch for the system operator, a laser firing defeat switch external to the system for the NSWCDD Test Conductor, and hardware/software laser firing cutouts unique to the STSTS. Documentation describing each of these features shall be provided not later than 15 days prior to initiation of site preparation to allow time for a laser safety SOP to be developed and approved.

2.3.5 Spare and Repair Parts and Maintenance Labor

Each vendor shall provide all spare and repair parts and all labor required to maintain the system in conformance with published specifications during the evaluation. All maintenance actions must be reported to the NSWCDD Test Conductor before they are implemented and after they are completed.

2.3.6 Equipment Installation and Teardown

Each vendor shall provide personnel for equipment installation prior to testing and equipment teardown and removal following testing. Each vendor shall provide all required special tools, templates, strongbacks, and other devices unique to their equipment and necessary for a safe and efficient installation and teardown process. Where termination of wires or cables requires special skills or training, vendor personnel shall accomplish such termination to ensure the proper performance of their systems.

2.3.7 Equipment Interface, Checkout, and Calibration

Each vendor shall provide personnel to assist NSWCDD personnel in establishing interfaces to designation equipments and site instrumentation. Vendor personnel shall have primary responsibility for ensuring that the implementation of the interfaces does not adversely affect performance of their equipments. Vendor personnel shall assist NSWCDD personnel in calibrating site instrumentation to ensure the integrity of test data.

2.3.8 Consumable Supplies

Each vendor shall provide all consumable supplies related to data collection, reduction, and analysis performed by them that are not specifically called out in this plan as being furnished by another party.

2.3.9 Data Reduction

Vendors are responsible for reducing, at their expense and using their data reduction resources, any data of interest to their own objectives. In addition, the vendors will be requested to reduce limited amounts of data using vendor-developed hardware, software, and methods for comparison with similar data reduced by NSWCDD as a validation of NSWCDD methodology, hardware, and software. Data reduction in support of NSWCDD's efforts shall be in accordance with the terms of the respective NSWCDD agreements with the vendors.

The desired vendor on-site data reduction capability is limited to processing of digital data extracted from the vendor's own system. Processing of other data formats (audio, video, etc.) is not required. The processed digital data will be compared with NSWCDD's quick-look data to verify the integrity of NSWCDD data. The capability to provide hard-copy data from a single target presentation (one inbound run) per test period at a sampling rate of 1 Hz and consisting of not more than 12 parameters will suffice if the data are available within 12 hr after completion of the specific test period.

2.3.10 Data Analysis

The vendors may, upon request by NSWCDD, provide to the NSWCDD data analysis team their interpretation of portions of the test data that NSWCDD considers questionable (because of loss of data, failure to record all pertinent parameters, or similar causes), or that appear to show a significant design or performance deficiency. The vendor-provided information may be used by NSWCDD

in determining whether or not to exclude questionable data from the evaluation database, as well as in determining whether or not NSWCDD's interpretation of the data is technically sound.

The desired vendor posttest, off-site data analysis capability includes the ability to process digital data extracted from the vendor's own system and recorded by the vendor and correlation of the digital data with video (sensor) data where necessary. Processing of other data formats is not required. Processing will be limited to not more than 10 percent of the total digital data collected. The 10 percent limit may be met by any combination of the following items.

- Analyzing the digital data from up to 10 percent of the inbound target presentations (start of run to end of run)

- Analyzing the digital data, up to 10 percent of the sum total time represented by all digital data, from selected portions of each (or selected) inbound target presentations (e.g., data related to initial target detection or video tracker acquisition range)

The vendor should assume that some portion of all parameters recorded will require reduction and analysis during some portion of the mentioned processing.

In general, the vendor will be expected to process the data at the maximum rate at which it was recorded, rather than by sampling the recorded data at a lower sampling rate (as was adequate for quick-look). The results of the vendors' data analysis will be compared with NSWCDD's analysis to identify any discrepancies in data interpretation. NSWCDD desires the data reduction to be completed within 15 days after NSWCDD identifies the data to be processed and the results of vendor analysis of the data within 15 days after completion of the data reduction by the vendor.

2.3.11 Posttest Meetings

The vendors shall assume that NSWCDD will require not more than two meetings at the vendor's facility of not more than 3-days duration each after the completion of testing. In general, the purpose of these meetings shall be to discuss NSWCDD's interpretation of test data and to discuss the results of vendor data reduction and analysis requested by NSWCDD, as described. NSWCDD may have additional contact with the vendor for the purpose of clarifying NSWCDD's understanding of the data by telephone or telecopier. Any action in preparation for or resulting from such contacts shall be limited to the data processing limits of paragraph 2.3.10. All meetings defined shall be completed within 60 days after the tests are completed.

2.4 CONFIGURATION MANAGEMENT

2.4.1 General

The configuration of the hardware and software under test shall be controlled throughout the testing to ensure the integrity of the test data. Both NSWCDD and the vendors shall have active roles in enforcing configuration control. The NSWCDD Test Conductor shall have primary responsibility for establishing and maintaining configuration control of the systems being tested during the evaluation.

2.4.2 Initial Configuration Definition

The configuration of the systems to be evaluated shall be fixed as each system is declared operational and ready for test by the vendor. At that time, the vendor's Configuration Manager shall be responsible for informing the NSWCDD Test Conductor of the initial configuration. The initial configuration summary shall address all changes implemented in the system that make the installed configuration different from the basic configuration defined in the industry questionnaire.

2.4.3 Configuration Changes

Once the configuration is fixed, the system configuration should not be changed for the remainder of the evaluation. In the event that a change must be made, the vendor must obtain the permission of the NSWCDD Test Conductor prior to incorporating any changes into the system. A vendor's Configuration Manager may request permission to modify the installed configuration at any time. The NSWCDD Test Conductor shall determine both if and when a requested change is to be implemented. To assist the NSWCDD Test Conductor in making the decision as to whether to permit the requested change to be incorporated and when to incorporate the change, the vendor shall provide a clear description of the requested change, a clear description of the rational for the change, the expected effect on system performance and/or operation, and the effect, if any, on data already taken. Particular attention shall be given to the impact on NSWCDD data extraction and supporting data extraction, data reduction, and data analysis software. In the event of an unresolved dispute with a vendor, the NSWCDD EOSE Program Manager shall have final decision authority.

2.4.4 Spot Checks

The NSWCDD Test Conductor shall make spot checks at random intervals to ensure that the system configuration has not changed. The NSWCDD Test Conductor shall be assisted by the vendor's Configuration Manager during these spot checks.

2.4.5 Repair Actions

Normal repair actions in which a failed part is replaced with another part (same part number) that is expected to perform, within normal manufacturing tolerances, identically with the original part shall not be considered configuration changes. However, the NSWCDD Test Conductor shall be informed of all repair actions both before and after they have been accomplished.

3.0 EVALUATION SUPPORT REQUIREMENTS

3.1 TEST TARGETS

3.1.1 Fixed Wing Air Targets

Fixed wing air targets shall consist of military aircraft such as an A-7 and civilian aircraft such as an MU-2.

3.1.2 Towed Air Target

The towed air target will consist of a simulated missile shape pulled behind a Lear jet.

3.1.3 Surface Targets

The surface targets shall consist of range boats operated by the NSWCDD range patrol, such as the NSWCDD sportfisherman and a U.S. Coast Guard cutter.

3.1.4 Floating Targets

The floating targets shall consist of actual inert mines and simulated mines. In addition, non-mine-shaped targets will be used as decoys. The mine-shaped targets and the decoy targets will be anchored in position off the STSTS shore line.

3.1.5 Periscope Target

A simulated periscope will be presented during the evaluation.

3.1.6 Swimmers/Man Overboard

The swimmers and men overboard will be a team of Explosive Ordnance Disposal (EOD) divers.

3.1.7 Targets of Opportunity

Other targets, both stationary and mobile, may present themselves throughout the course of the evaluation. These may include aircraft, boats, birds, telephone poles, water towers, etc. If time permits, passive imaging and/or tracking of these targets of opportunity may occur if doing so helps to satisfy evaluation objectives. Under no circumstances shall tracking of targets of opportunity occur using a laser rangefinder or if safety is in any way compromised.

3.1.8 Target Transponders

A transponder may be mounted on the targets to help in tracking by range control and instrumentation radars. The tuned frequency of the transponder will be determined by the radar frequency in use by the range control radar during the evaluation.

3.2 FACILITIES

3.2.1 Test Area

The evaluation will be conducted at the Naval Surface Warfare Center facility in Dahlgren, Virginia using the STSTS and PRTR. Figure 3-1 shows the location of the STSTS within NSWCDD, with respect to the Potomac River and surrounding land areas. Figure 3-2 shows the PRTR, which is a controlled-access area of the Potomac River adjacent to the STSTS.

3.2.2 Mobility Within NSWCDD

3.2.2.1 Identification. All visitors to NSWCDD must obtain an identification badge at the visitor's center adjacent to the main gate before entering NSWCDD.

3.2.2.2 Foreign Nationals. All EOSE vendor personnel who are not citizens of the United States must be approved by the Navy International Programs Office, Crystal Gateway North, Suite 701, Arlington, Virginia before they will be allowed access to NSWCDD.

3.2.2.3 Escort Requirements. All EOSE vendors who are not citizens of the United States and those who do not qualify for a *No Escort* status must be escorted by an NSWCDD employee while on NSWCDD property. Failure to be properly escorted may result in denial of access to NSWCDD.

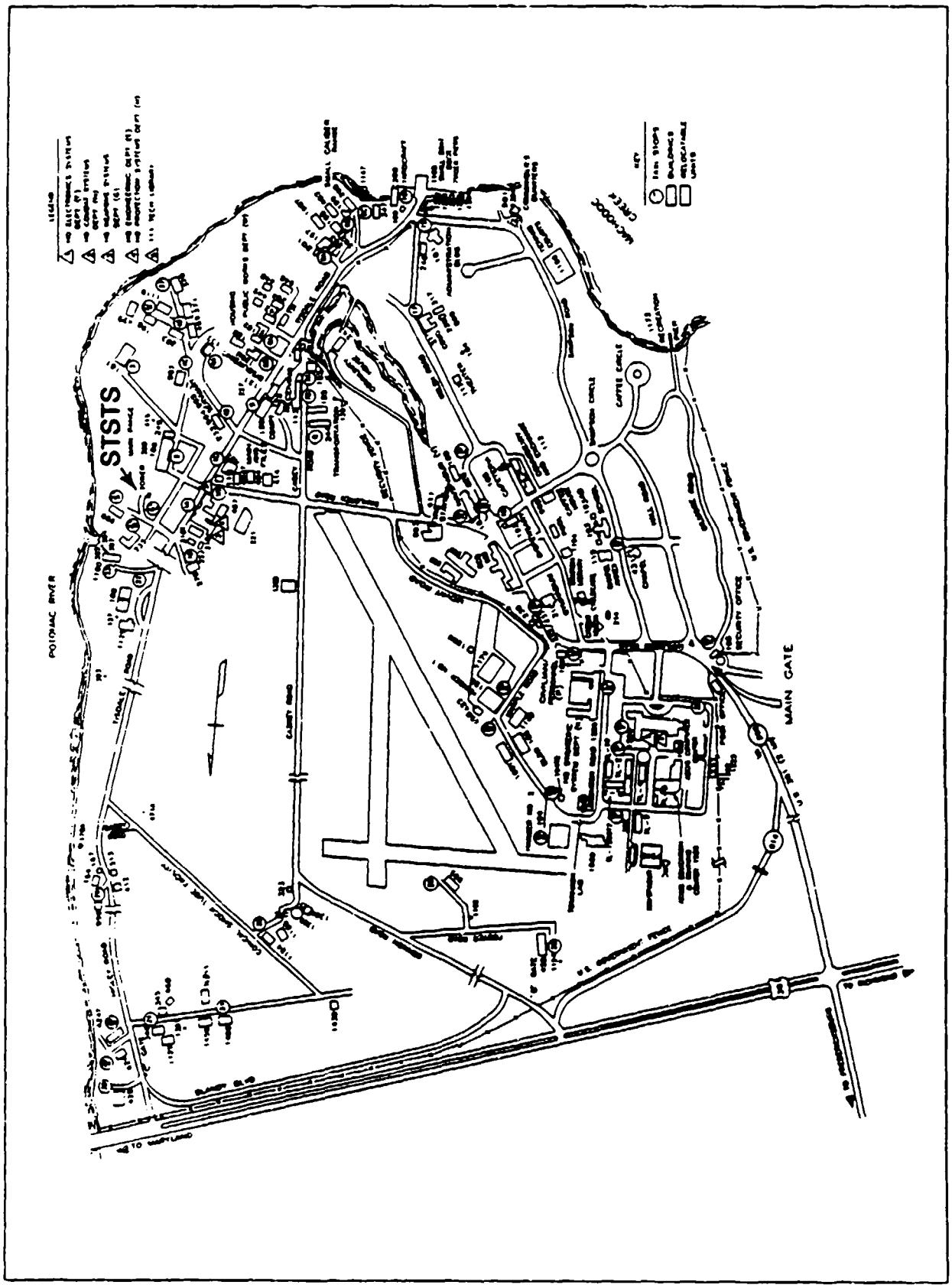

FIGURE 3-1. STSTS LOCATION

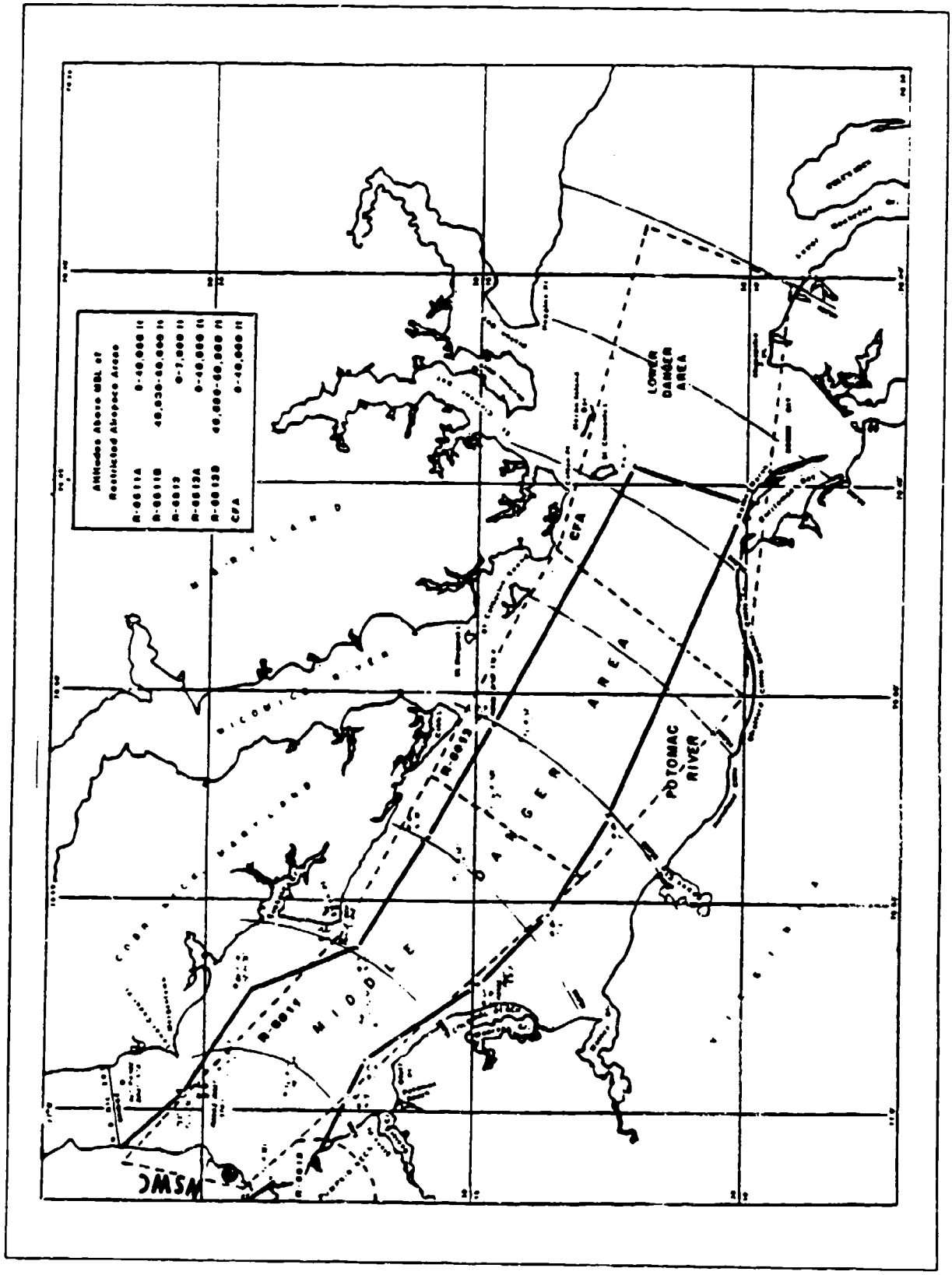

FIGURE 3-2. NSWCDD PRTR

3.2.2.4 Travel as a Group. Unless specific arrangements are made with the NSWCDD EOSE Program Manager for multiple escorts, all personnel from a single vendor are expected to arrive and depart as a group to ensure that other STSTS activities are not adversely affected.

3.2.2.5 Working Hours. Normal working hours are 0730 to 1645 local time, Monday through Friday. Federal holidays are observed. Work outside these hours must be arranged in advance with the NSWCDD EOSE Program Manager. Reasonable efforts will be made to accommodate requests for additional work time; however, non-availability of sufficient personnel to meet safety or security rules may preclude a favorable response to individual requests. In general, an alternate schedule will be proposed by the NSWCDD EOSE Program Manager if the requested support cannot be provided.

3.2.3 Search and Track Sensor Test Site

The STSTS is a permanent test facility with direct line-of-sight (LOS) access to the PRTR.

3.2.3.1 Electrical Power. The types of electrical power available at the STSTS are listed in Table 3-1.

TABLE 3-1. STSTS ELECTRICAL POWER

Volts	Frequency (Hz)	Phases	Type	Current (A)
440	60	3	wye	100
440	60	3	wye (outside)	200
220	60	3	wye	800
115	60	3	wye	325
115	60	3	delta	100
440	400	3	wye	100
115	400	1		100

3.2.3.2 Equipment Location. The vendor directors will be mounted on the STSTS ETF building using foundations supplied by NSWCDD.

3.2.3.3 Telephones. Government telephones are installed throughout the STSTS that connect to the Department of Defense (DoD), Defense Switched Network and to the commercial direct dial network giving international access. Access to

Government telephones shall be restricted to needs relating directly to this evaluation. All long distance calls made by vendors on Government phones must be paid for by credit card. Vendors are not authorized to make personal calls from NSWCDD phones or calls not associated with the EOSE project. If desired, the Test Site Manager can provide each vendor with information necessary to obtain a private telephone line. The billing for this service will be directed to the vendor and will not be paid for by the Government. Additional unique telephone service will not be available at the STSTS.

3.2.3.4 Office and Storage Space. No office or storage space is available at the STSTS. Each vendor must provide a specialized container to satisfy this requirement.

3.2.3.5 Storage of Classified Material. Classified material up to and including SECRET can be stored in appropriate security containers at the STSTS. Each vendor must submit an estimate of required classified storage volume to the NSWCDD EOSE Program Manager at least 60 days prior to arrival on site. The vendor shall provide standard security clearance information to NSWCDD defining the personnel authorized access to the classified material. Unless otherwise stated in writing to the NSWCDD EOSE Program Manager, all vendor provided equipment shall be considered UNCLASSIFIED.

3.2.4 Potomac River Test Range

The PRTR is a controlled-access area of the Potomac River, which is approximately 25 nmi in length and sufficiently wide to provide a 10-deg field of regard over water without visible land background. The PRTR is administered and controlled by the NSWCDD Weapons Evaluation Division, which is responsible for range scheduling, range safety, range instrumentation, and supervisory control of all testing.

3.2.4.1 Frequency Reporting. All radio, laser, and radar frequencies to be used during the evaluation must be submitted to and approved by Range Control prior to first emission to verify that no interference with other systems or possible safety problems will occur. The details concerning frequency emissions, such as obtaining approval, are found in Section 8.4. Only Government radio equipment shall be used during this evaluation for range communication.

3.2.4.2 Scheduling. All use of the PRTR by the EOSE project shall be scheduled by the Range Operations Branch to ensure that necessary range instrumentation, surveillance, and communications facilities are available, and that incompatible users are not permitted access to the range concurrently with EOSE usage.

3.2.4.3 Range Instrumentation. The Range Instrumentation Branch will assist the EOSE project in interfacing to existing range surveillance sensors to provide

designation data for the evaluation. The Range Instrumentation Branch will also ensure that the EOSE interface does not degrade the basic surveillance function.

3.3 EQUIPMENT

3.3.1 Nike-Hercules Radar

The Nike-Hercules radar is a three-dimensional (3-D) tracking radar operated by the NSWCDD Range Instrumentation Section in support of aircraft operations on the range. The radar is located at Range Station 9, Colonial Beach, Virginia, approximately 9k yd down range of the STSTS.

3.3.2 Precision Optical Director (POD)

The POD is a two-axis precision pedestal. It will be equipped with a daylight TV camera having a long focal length lens giving it a narrow field of view (FOV) for the evaluation and a TIS. This sensor, coupled with a video tracker, will provide target azimuth and elevation information.

3.3.3 Master Range Clock

The NSWCDD Range Instrumentation Section operates the master clock for time-tagged range data. This clock signal is provided to the STSTS using a fiber-optic cable from Building 997. The STSTS equipment shall buffer the time data and distribute it in suitable formats, including parallel digital, serial digital, and audio encoded for use by data recording equipments. A visible display of time shall also be provided for use by personnel maintaining hard-copy test logs.

3.3.4 Main Range Designation Source

The main range designation source will be a computer system that accepts target position data from several sources such as the Nike-Hercules radar and the POD and outputs relative target position coordinates using a serial link. The reference for the coordinate system will be a single point located at the STSTS. An IRIG time tag for the position data and a status word indicating the sources of the raw target position data and a *data valid* indicator will be provided with each target data set.

3.3.5 Digital Data Collection System

The digital data collection system will consist of a data collection subsystem for each vendor and a status and control subsystem, which are all interconnected by an Ethernet local area network (LAN). A block diagram of the digital instrumentation system is presented in Figure 3-3.

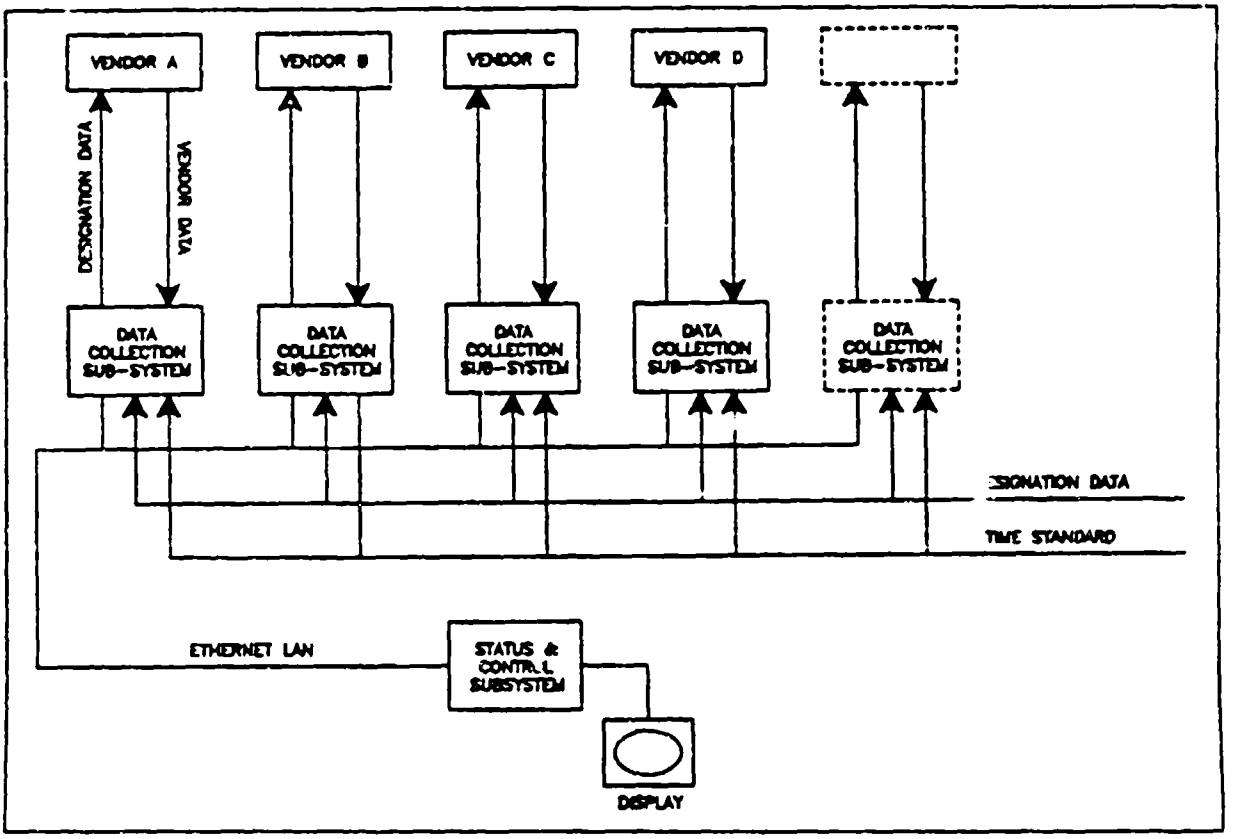

FIGURE 3-3. DIGITAL DATA COLLECTION SYSTEM

3.3.5.1 Data Collection Subsystem. Each vendor system will be provided with one data collection subsystem that will consist of a single computer with two central processing units (CPU) sharing common memory. The function of the first CPU is to collect serial target position data from the main range designation source, perform any necessary target parallax correction for its corresponding vendor system, convert it to the required output format, and output that data to the vendor system. Target position data shall be of sufficient accuracy to place the target within each vendor's system's narrow FOV and shall be output to each vendor system simultaneously. The function of the second CPU is to collect the vendor system data and NSWCDD target position data for storage on removable mass storage media. Time code data from the master range clock will be input to the data collection subsystems to time-tag the

stored data. The Ethernet LAN will be connected to the second CPU for status, control, and quick-look data extraction under the control of the status and control subsystem.

3.3.5.2 Status and Control Subsystem. The status and control subsystem is a processor that provides a single-user interface for the entire digital data collection system. A high-resolution color monitor will display real-time, quick-look data and status during testing. The digital data system operator will be able to simultaneously control all of the data collection subsystems using the Ethernet LAN. This will allow the digital data system operator to synchronize the start and stop of target position data output from the data collection subsystems, as well as data collection inputs from the vendor systems. Also, the system operator will be able to program fixed angular target designation offsets from the status and control subsystem so that vendors will not know exactly where targets are located within their sensors' narrow FOVs for the target detection tests.

3.3.6 Video Data Collection and Display System

Video recorders and monitors shall be used for the purposes of recording and displaying the vendors' TIS video, TV video (i.e., LLLTV or daylight TV), and operator's video (i.e., annotated version of either the TIS or LLLTV/daylight TV). A symbology generator will be used to annotate the recorded video with information such as the test event number. In addition, a multiplexed monitor shall be used to simultaneously view all (up to six) of the operators' video. A block diagram of the video instrumentation system is presented in Figure 3-4.

TV format video data shall be recorded on commercially available video cassette recorders (VCR) in enhanced super VHS format. The VCRs are capable of recording common U.S video standards such as RS-170 and RS-343. Imagery for data reduction and analysis purposes will be output to television monitors compatible with the various line rates. Time data shall be recorded on an audio track of the video cassette. The second audio track will be used to record Test Conductor and system operator audio data.

3.4 PHOTOGRAPHIC SERVICES

Because of NSWCDD security restrictions, vendors will be limited/prohibited in operating video and photographic equipment while on NSWCDD property. Upon request to the NSWCDD EOSE Program Manager, limited photographic services can be provided by NSWCDD. Services include still color and black and white photography, film developing and printing, video tape recording in U.S. format, and issuance of limited quantities of still picture film and Polaroid film. Costs will be born by the NSWCDD EOSE project.

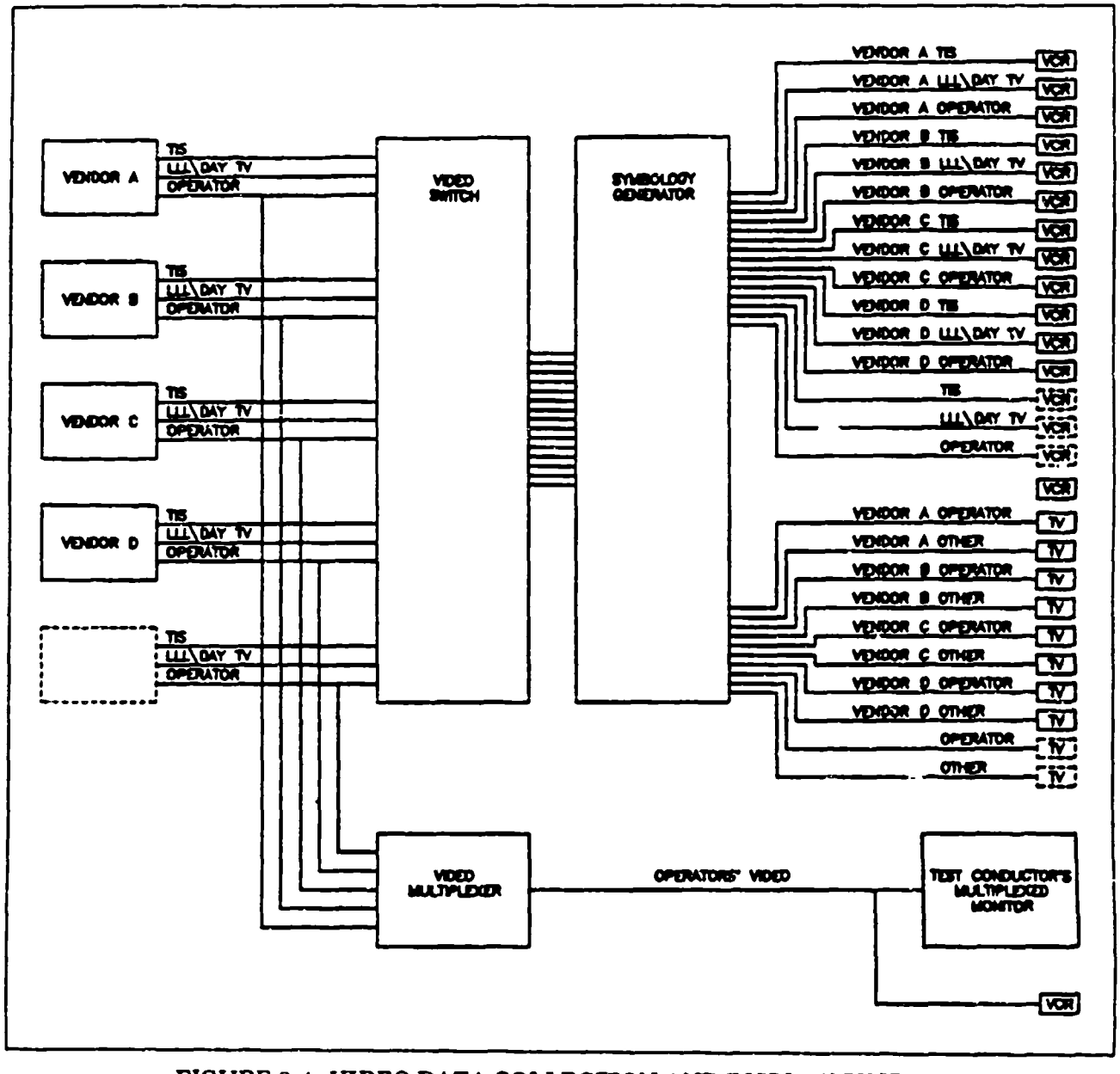

FIGURE 3-4. VIDEO DATA COLLECTION AND DISPLAY SYSTEM

4.0 SPECIFIC EVALUATION OBJECTIVES

4.1 PRIMARY OBJECTIVES

Specific primary objectives of the evaluation related to system tactical performance are listed in the following subparagraphs. The data to support each objective will be gathered under prevailing weather conditions.

4.1.1 Objective P1

Determine the detection range capability of the system for each sensor in the system (i.e., visible, infrared (IR), laser) for various targets.

4.1.2 Objective P2

Determine the time required to establish two-dimensional (2-D) and 3-D firm track upon receipt of a designation (azimuth, azimuth/elevation, or azimuth/elevation/range) of various targets that are within detection range.

4.1.3 Objective P3

Determine 2-D and 3-D firm track range capability of the system for various targets.

4.1.4 Objective P4

Determine 2-D and 3-D track accuracy of the system for various targets.

4.1.5 Objective P5

Determine the recognition range capability of the system for various surface targets.

4.1.6 Objective P6

Evaluate the continuity of the system track during system FOV and mode changes (TV-to-IR, etc.).

4.2 SECONDARY OBJECTIVES

The secondary objectives are listed in the following subparagraphs.

4.2.1 Objective S1

Evaluate the reliability, maintainability, and availability (RMA) of the system.

4.2.2 Objective S2

Evaluate system compatibility with existing U.S. Navy reliability and maintainability (R&M) procedures, practices, and training.

4.2.3 Objective S3

Evaluate system suitability for U.S. naval fleet operations.

4.2.4 Objective S4

Evaluate system safety or hazard levels.

4.2.5 Objective S5

Evaluate degree of system maturity.

4.2.6 Objective S6

Measure 2-D track continuity in the presence of target maneuvers.

5.0 MILESTONES AND SCHEDULE

5.1 MILESTONES

The major milestones of the EOSE program are shown in Table 5-1.

TABLE 5-1. MILESTONES

Event	Date
Government Invitation to Specific Vendors to Evaluation	5 Mar
Government Publish Master Plan for Evaluation	1 Apr
Final Interface Definition	1 Apr
Evaluation Site Preparation Initiated	20 Apr
Government Publish Evaluation Procedures	12 Jun
Begin Vendor Equipment Installation at Site	21 Jun
Begin Vendor Equipment Checkout	5 Jul
Begin Testing	12 Jul
Complete Testing	30 Jul
Complete Vendor Equipment Removal	13 Aug
Submit Final Report to PEO(SD)	30 Sep

5.2 INSTALLATION ACTIVITIES

The system installation activities will include a system checkout phase and an external interface phase. During the system checkout phase, the systems will be installed and their operation will be verified by the vendors. During the external interface phase, the systems will be interfaced to NSWCDD instrumentation and designation equipment, and operation of the interfaces and systems will be verified. This phase will demonstrate that the interfaces do not degrade normal operation or performance of the industry systems. NSWCDD will provide a civilian aircraft such as an MU-2 for up to one, 2-hr period every other day during the checkout phase to verify system operation. In addition, targets of opportunity may be used as long as they are consistent with range safety.

5.3 TEST SCHEDULE

The following paragraphs describe the active test time for the active test days. The test schedule is given in Table 5-2. There are a total of nine planned test days. Each test day will consist of two, 2-hr test periods. The vendors are required to participate in the additional pre-test and posttest activities as described in Section 6.0.

TABLE 5-2. TEST SCHEDULE

Day	Date	Times	Events
Mon	12 Jul	1530-1730 2000-2200	Fixed Wing Air Target Test (Prop) Surface Target Test
Wed	14 Jul	0830-1030 1300-1500	Periscope Detection Test Floating Target Test
Fri	16 Jul	0300-0500 0730-0930	Floating Target Test Surface Target Test
Mon	19 Jul	1530-1730 2000-2200	Towed Air Target Periscope Detection Test
Wed	21 Jul	0300-0500 0730-0930	Swimmer Detection Test Fixed Wing Air Target Test (Jet)
Fri	23 Jul	0300-0500 0730-0930	Man Overboard Test Floating Target Test
Mon	26 Jul	1530-1730 2000-2200	Surface Target Test Floating Target Test
Wed	28 Jul	0300-0500 0730-0930	Swimmer Detection Test Periscope Detection Test
Fri	30 Jul	0300-0500 0730-0930	Periscope Detection Test Floating Target Test

5.3.1 Normal Test Day

During a normal test day, the first test period will be conducted from approximately 0830 to 1030 hours local time and the second test period will be conducted from approximately 1300 to 1500 hours local time. A variation of up to plus or minus 1 hr in starting times shall be considered normal to allow for day-to-day scheduling of the NSWCDD range. Regardless of starting time, the active test time shall not exceed 2 hr maximum in each test period.

5.3.2 Shifted Test Day

There are two types of shifted test days: early and late. During an early shifted test day, the first test period will be conducted from approximately 0300 to 0500 hours local time and the second test period will be conducted from approximately 0730 to 0930 hours local time. During a late shifted test day, the first test period will be conducted from approximately 1530 to 1730 hours local time and the second test period will be conducted from approximately 2000 to 2200 hours local time. A variation of up to plus or minus 2 hr in starting times shall be considered normal to allow for scheduling of the NSWCDD range. Regardless of starting time, the active test time shall not exceed 2 hr maximum in each test period.

5.3.3 Weather Restrictions

Weather conditions shall be whatever exists at the time of the evaluation that allows for the safe conduct of the testing in accordance with established NSWCDD range safety requirements. Testing during periods of lightning, heavy rain, dense fog, and certain NSWCDD test programs not a part of this evaluation shall not be permitted.

6.0 EVENT DESCRIPTIONS

6.1 GENERAL PROCEDURES

All testing shall be performed in accordance with the approved evaluation procedures. These procedures shall be made part of the test record. The Test Conductor must authorize and fully document any deviation from the evaluation procedures.

6.2 METHODOLOGY

The following activities shall be accomplished on each day in which formal testing is scheduled. Where necessary to streamline the accomplishment of the scheduled tests, the Test Conductor may vary the order of some activities. If the order is altered, the Test Conductor shall provide adequate notice to all vendors.

6.2.1 Equipment Checkout and Calibration

The test day will begin with all equipment to be used in the planned test being powered up and its readiness to support the planned test events verified. This may be accomplished by the performance of a standardized Daily System Operability Test or an equivalent test that qualitatively verifies equipment and system operation. Any required daily calibration, such as laser cutout verification, shall also be accomplished during this time period.

6.2.2 Pre-Test Briefing

The Test Conductor shall conduct a pre-test briefing prior to commencement of testing on each test day. At least one representative of each vendor and each major test support function (data recording, POD operator, senior EOSE technician, etc.) shall attend the pre-test briefing. During this briefing, the Test Conductor will summarize the test objectives, outline the test events, outline any special test procedures unique to the planned test, ensure that all test vendors understand their assigned role in support of the test, explain the importance of hard-copy data sheet entries, and obtain and assess the results of equipment checkout and calibration (including target readiness and weather status) reported by the respective equipment operators. Based upon the reported equipment status, the Test Conductor may confirm that the planned test will commence as scheduled, modify the planned test, reschedule the test, or substitute another test.

6.2.3 Testing

Testing will be conducted in accordance with the approved evaluation procedures. The evaluation procedures will conform to the general methodology defined in this plan. During each test, data shall be collected as defined in Section 7.0 with the instrumentation systems defined in Section 3.3. In general, the directors of the vendors' systems will be returned to a standard stowed position prior to commencement of each target presentation so that designation and acquisition performance can be determined. Data validation will be performed during testing to highlight corrupted data and to best use the limited test time.

6.2.4 Posttest Debriefing

The Test Conductor shall conduct a posttest debriefing at the conclusion of each test period (time permitting) or each day in which testing is accomplished. All who participated in the pre-test briefing shall attend the posttest debriefing. Attendance by each person who participated in the test is specifically encouraged. The posttest debriefing is intended to be a meeting for frank and open discussion of the concluded tests. Vendors are expected to take an active role in presenting the performance of themselves and the equipment for which they are responsible. Hard-copy notes made during the test are a valuable aid to a meaningful debriefing. During the debriefing, the vendors shall inform the Test Conductor of the performance of their equipment. Unplanned, unexpected, erroneous, and undesired or unsafe operation must be reported whether it is the result of test procedures, equipment malfunction, equipment design deficiency, operator error, or other causes. Where necessary to protect proprietary data, a vendor may request *splinter* debriefing sessions with the Test Conductor and other NSWCDD personnel. The Test Conductor shall also summarize for the attendees the perceptions of the test. The Test Conductor will highlight problem areas needing corrective action prior to further testing and will identify areas of special interest for the quick-look data review process. Finally, before concluding the meeting, the Test Conductor will summarize the schedule for the next planned tests.

6.2.5 Quick-Look Data Review

Upon the conclusion of the posttest debriefing, a review of the test data shall begin to determine its integrity and validity. Data recorded in hard-copy, analog, digital, and video form shall be reviewed. In addition to a standardized list of parameters, additional test-unique parameters shall be reduced and the output distributed to the Test Conductor, the vendors, and other appropriate parties in accordance with the limitations of Sections 7.0 and 9.0. The results of the quick-look data review will be used to help the Test Conductor determine how testing should proceed.

6.2.6 Stand Down

All personnel not involved with data reduction shall secure their equipments and either initiate preparations for the next planned test or commence preventive and/or corrective maintenance as required to prevent a recurrence of problems noted in the concluded tests.

6.3 TEST EVENTS

The following paragraphs outline the test procedures to be performed for each class of target. Unless otherwise indicated, the tests described shall be performed with all EOSE vendor systems being tested simultaneously. The Test Conductor shall select which sensor mode is to be used for each test run; i.e., visible or IR.

6.3.1 Air Target Tests

Each air target test shall consist of a set of orbital flight paths, as shown in Figure 6-1, by either fixed-wing or towed aerial targets over the test range. Only one target will be presented during an individual test period.

The expected maximum detection range for the target shall be estimated, based on modeled performance predictions and previous detection experience, and shall be used in planning each detection test run. The target shall have completed its inbound turn and stabilized on its flight profile before reaching the expected maximum detection range. This will provide the vendor systems with a frontal view of the target for detection. Upon the commencement of each test run, the vendor systems shall be provided with designation data and the vendor operators shall attempt to detect and track the air target with the sensor ordered by the Test Conductor. At a minimum, target tracking shall continue until the target has completed its outbound turn so that track continuity in the presence of maneuvers can be evaluated. The vendor operators shall also attempt to determine the target's range using their laser rangefinders when the Test Conductor announces it is safe to do so. The Test Conductor shall determine if the test target is within the laser-safe region of the range area and if the range is clear before allowing the firing of the laser rangefinders.

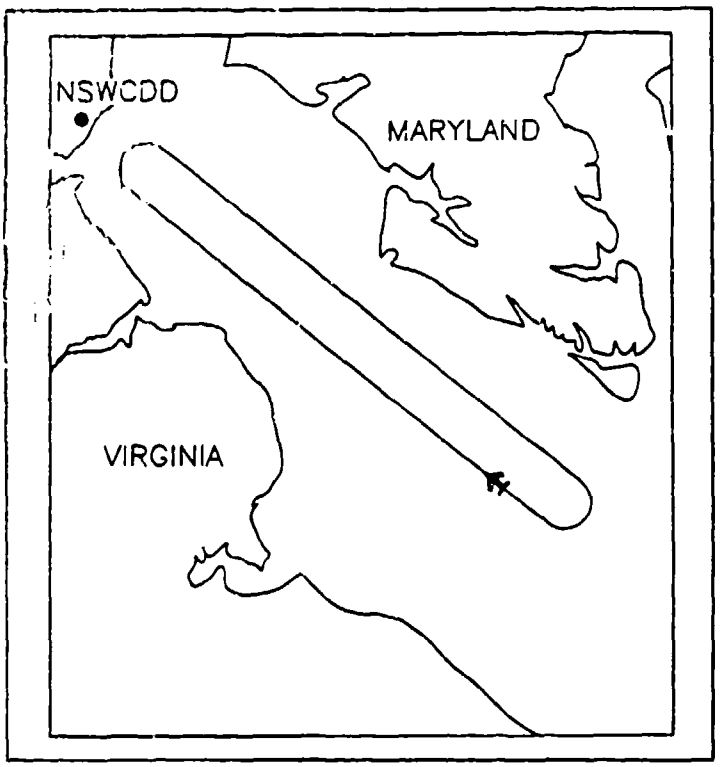

FIGURE 6-1. FLIGHT PATH OF AIR TARGETS

After the target detection phase is complete, the time required to establish firm track will be evaluated. The Test Conductor shall order the vendors to direct their sensors toward a common point such as the power plant smoke stacks. This will provide a common starting point for all vendor systems that is substantially different in azimuth from the target path (approximately 90 deg in this case). The target shall have completed its inbound turn and stabilized on its flight profile before reaching the expected tracking range for this test. When the target is within the tracking range of the vendor systems, the vendor systems will be provided with target designation data and the vendor operators will attempt to acquire, track, and center the target in the sensor FOV as quickly as possible. Laser rangefinders will not be used during this phase of the test because the vendor systems' LOSs will not all move into the laser safe region of the range at the same time. This will make it difficult for the Test Conductor to maintain absolute safety for all systems using the Test Conductor defeat switch, while at the same time ensuring valid data are being collected.

Depending on the initial results of the target detection phase and the time required to establish firm track phase of the air target tests, the Test Conductor may ask the vendors to change sensors or sensor FOVs while tracking the target during these tests to evaluate the effect on track continuity. Otherwise, the Test Conductor will allocate several target runs specifically to evaluate the track continuity during FOV and sensor changes.

Instrumentation shall be started and data collected from the beginning of the first run, which will be the downrange turnaround point (i.e., before the target designation data is provided) and will continue until the Test Conductor announces the end of the test period. Vendor operators shall verbally report target detection as it occurs. This data will be recorded on an audio track of the VCRs along with NSWCDD observer comments. Time-tagged vendor system azimuth, elevation, range, and tracker data, as well as sensor video data, shall be collected throughout the test. Time-tagged, ground-truth target range, azimuth, and elevation data (referred to sensor location) shall also be collected throughout the test.

Vendor target detection range shall be determined by using the time-tagged audio data and ground-truth range data. Recorded tracker data and laser rangefinder data will then be analyzed to determine firm 2-D and 3-D track range capability. The time required to establish 2-D firm track upon designation will be evaluated by determining the time between the start of target designation and the start of video tracking using ground-truth data and vendor tracker data. The time required to establish 3-D firm track upon designation will be estimated by determining the time between the start of target designation and the time when the sensor LOS stabilizes on the target. This will be done using ground-truth target position data, vendor sensor position data, and video data. Two-dimensional and 3-D track accuracy will be determined by comparing the vendor system target position data with the ground-truth target position data. Track continuity during mode changes shall be evaluated by reviewing recorded tracker data. Track continuity in the presence of maneuvers shall be evaluated by reviewing recorded tracker data that corresponds to the target's outbound turn.

6.3.2 Surface Target Tests

Each surface target test shall consist of orbital runs over the test range by two boats with different spatial features. The expected maximum detection ranges for each target shall be estimated, based on modeled performance predictions and previous detection experience, and shall be used in planning the test runs. The targets shall have completed their inbound turns before crossing inside of the expected maximum detection range for the test. The targets will then travel, well separated in line abreast, towards the STSTS using a serpentine path as shown in Figure 6-2. This will provide the vendor system with a partial side view of the targets. The Test Director shall determine when the targets should be turned outbound based on reported vendor system performance. The surface targets will then return to a position beyond the maximum detection ranges of the vendor systems in preparation for the next test run. When the targets are beyond the detection ranges of the vendor systems, the left/right positions of the targets may, or may not, be changed so that the vendors will not be able to identify the targets based on left/right position. The surface targets will then be ready to begin the next test run.

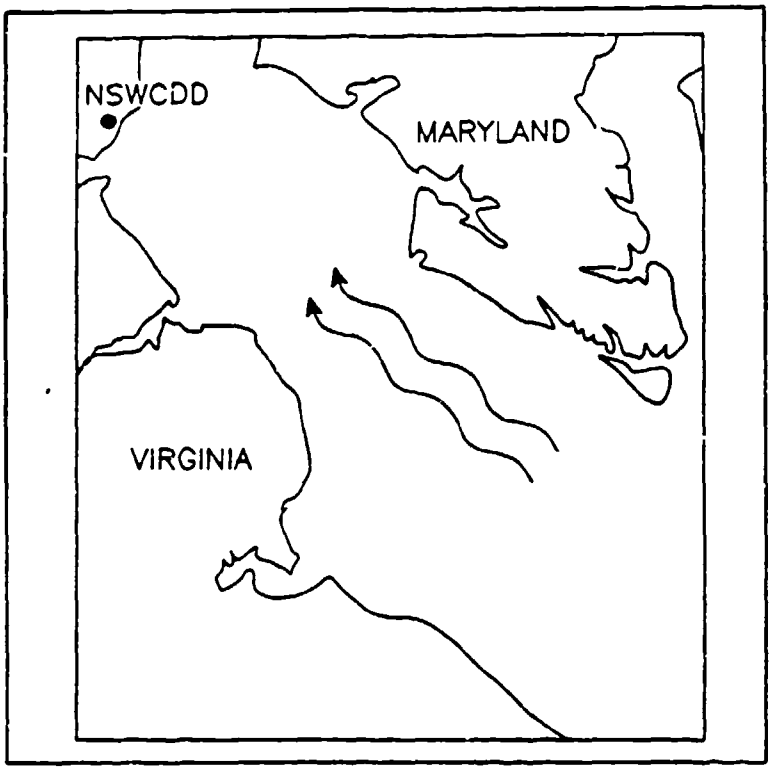

FIGURE 6-2. APPROACH PATH OF SURFACE TARGETS

Upon the commencement of each test run, the vendor systems shall be provided with designation data and the vendor operators shall attempt to detect and track the surface targets with the sensor ordered by the Test Conductor. The vendor operators shall also attempt to determine the targets' ranges using their laser rangefinders when the Test Conductor announces it is safe to do so. The Test Conductor shall determine if the test targets are within the laser-safe region of the range area and if the range is clear before allowing the firing of the laser rangefinders. After the targets are detected, the vendor operators shall attempt to distinguish between (recognize) the two classes of boats. The system operators are expected to be familiar with the characteristics of the boats from information provided to the vendors. Where possible, these tests should be repeated with different operators to increase the reliability of the sample.

After the targets have turned outbound, the time required to establish firm track will be evaluated. The Test Conductor shall order the vendors to direct their sensors toward a common point such as the power plant smoke stacks. This will provide a common starting point for all vendor systems, which is substantially different in azimuth from the target paths (approximately 90 deg in this case). While at least one of the targets is within the tracking range of the vendor systems, the vendor systems shall be provided with target designation data for that target and the vendor operators will attempt to acquire, track, and center the target in the sensor

FOV as quickly as possible. Laser rangefinders will not be used during this test because the vendor systems' LOSs will not all move into the laser-safe region of the range at the same time. This will make it difficult for the Test Conductor to maintain absolute safety for all systems using the Test Conductor defeat switch, while at the same time ensuring valid data is being collected. This test will be repeated several times during the targets' outbound runs, if possible. Also during the targets' outbound runs when at least one target is within tracking range, the Test Conductor shall ask the vendors to change sensors or sensor FOVs while tracking one of the targets to evaluate the effect on track continuity.

Instrumentation shall be started and data collected from the beginning of the first run, which will be the downrange turnaround point (i.e., before the target designation data is provided) and will continue until the Test Conductor announces the end of the test period. If the Test Conductor decides that there will be a significant amount of time during the outbound runs in which there will be no useful data, the Test Conductor may order data collection stopped until the start of the next test run. The Test Conductor shall then be responsible for announcing when data collection should begin and stop for each test run. During each test run, vendor operators shall verbally report target detection and recognition as it occurs. This data will be recorded on an audio track of the VCRs along with NSWCDD observer comments. Time-tagged vendor system azimuth, elevation, range, and tracker data, as well as sensor video data, shall be collected during the test. Time-tagged, ground-truth target range, azimuth, and elevation data (referred to sensor location) shall also be collected throughout the test.

Vendor target detection range shall be determined by using the time-tagged audio data and ground-truth range data. Recorded tracker data and laser rangefinder data will then be analyzed to determine firm 2-D and 3-D track range capability. The time required to establish 2-D firm track upon designation will be evaluated by determining the time between the start of target designation and the start of video tracking using ground-truth data and vendor tracker data. The time required to establish 3-D firm track upon designation will be estimated by determining the time between the start of target designation and the time when the sensor LOS stabilizes on the target. This will be done using ground-truth target position data, vendor sensor position data, and video data. Two-dimensional and 3-D track accuracy will be determined by comparing the vendor system target position data with the ground-truth target position data. Track continuity during mode changes shall be evaluated by reviewing recorded tracker data.

6.3.3 Floating Target Tests

Three each of three different actual inert mines and simulated mine shapes shall be deployed along with non-mine-shaped decoy targets for the floating target tests. Anchored in position and floating on the surface, the decoy and mine-shaped targets will be deployed in a 15-deg sector in a range band as shown in Figure 6-3. The deployment design will be implemented in such a way that the position of each target can be determined using sensor azimuth and elevation data. Initial deployment range will be determined based on modeled performance predictions. Depending on the results of previous deployments, the mines will be moved to different range bands (closer or farther away) and the test will be repeated to determine the maximum ranges at which the mines can be detected, classified, and recognized.

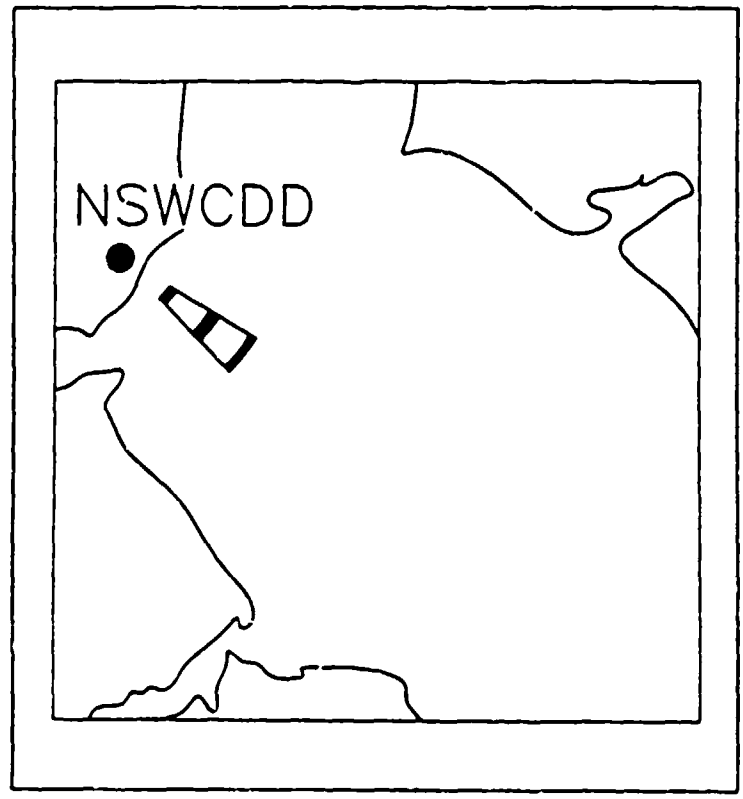

FIGURE 6-3. MINE SHAPE DEPLOYMENT

Upon commencement of the test, the vendor operators shall attempt to detect, classify, and recognize the mine shapes with the sensor ordered by the Test Conductor. Target designation shall not be given for the detection/recognition phase of the floating target tests. Vendor operators shall be given the 15-deg wide sector in which to search for the mine shapes, but will not be given the range band. The test event will be continued until all mines are detected or until the end of the scheduled

test period, as determined by the Test Conductor. After the target detection/recognition phase is complete, the vendors will attempt to track the targets that they detected because the mine shapes will be good examples of low contrast targets. After the target tracking phase, the Test Conductor shall ask the vendors to determine the range of selected mines using their laser rangefinders. The position of selected mines shall be given to the vendors and the mines shall be within the laser-safe region of the range area.

Instrumentation shall be started and data collected from the beginning of the test and will continue until the end of the test, as announced by the Test Conductor. Vendor operators shall verbally report target detection, classification, and recognition as it occurs. This data will be recorded on an audio track of the VCRs along with NSWCDD observer comments. Time-tagged vendor system azimuth, elevation, range, and tracker data, as well as sensor video data, shall be collected throughout the test. Target ground-truth data (azimuth, elevation, and range) shall be determined subsequent to the deployment of the targets by NSWCDD EOD personnel.

Vendor operator target detection, classification, and recognition times, ranges, and accuracy shall be determined by using time-tagged audio data, vendor system data, and ground-truth data. Firm track range capability will then be analyzed using the recorded tracker data. Laser rangefinder data will be reviewed along with the sensor LOS data and ground-truth data to ascertain whether the vendor systems were able to determine the range of the selected mine shaped targets. If the laser rangefinder is able to determine the range of the mine shaped targets, the accuracy of the range measurements will be evaluated.

6.3.4 Periscope Detection Test

A periscope target simulator and two range patrol boats shall be used for the periscope tests. Each periscope test shall consist of a set of orbital runs over the test range, as shown in Figure 6-4. The range patrol boats shall travel at speeds of 5 kn or less. One range patrol boat will be used to tow the periscope target simulator, a decoy target, or no target. The second range patrol boat will tow a decoy target or no target. One possible scenario for the test is for two range patrol boats to follow the test pattern without towing the periscope target at all. The target shall have completed its turn and stabilized on the test profile before crossing inside of the expected maximum detection range for the test. The expected maximum detection range for the target shall be estimated, based on modeled performance predictions and previous detection experience, and shall be used in planning the test runs. As the test progresses, the target ranges will be reduced until the end of the test period, as determined by the Test Conductor.

Upon commencement of each test run, the vendor operators shall attempt to detect and track the simulated periscope target with the sensor ordered by the Test

Conductor. During the detection phase of the periscope test, target designation shall not be given. Where possible, the detection tests should be repeated with different operators to increase the reliability of the sample. After the target detection phase is complete, vendor systems shall be provided with designation data and the vendors shall attempt to determine the range of the simulated periscope using their laser rangefinders when the Test Conductor announces it is safe to do so. The Test Conductor shall determine if the test target is within the laser-safe region of the range area and if the range is clear before allowing the firing of the laser rangefinders.

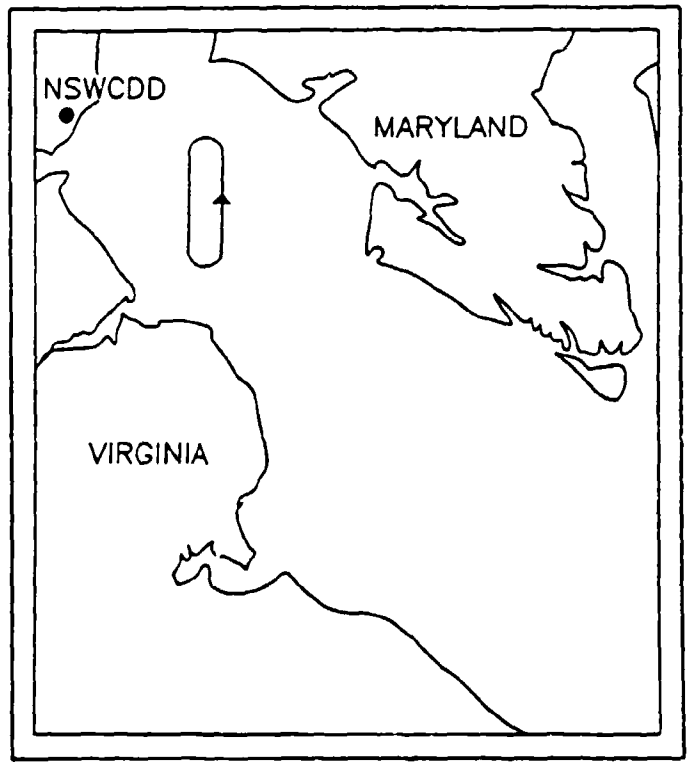

FIGURE 6-4. PATH OF PERISCOPE TARGETS

Instrumentation shall be started and data collected from the beginning of the test and will continue until the end of the test, as announced by the Test Conductor. Vendor operators shall verbally report target detection as it occurs. This data will be recorded on an audio track of the VCRs along with NSWCDD observer comments. Time-tagged vendor system azimuth, elevation, range, and tracker data, as well as sensor video data, shall be collected throughout the test. Time-tagged, ground-truth target range, azimuth, and elevation data (referred to sensor location) shall also be collected throughout the test.

Vendor operator target detection ranges and accuracies shall be determined by using time-tagged audio data, vendor system data, and ground-truth data. Firm

track range capability will then be analyzed using the recorded tracker data. Laser rangefinder data will be reviewed, along with the sensor LOS data and ground-truth data to ascertain whether the vendor systems were able to determine the range of the simulated periscope target. If the laser rangefinder is able to determine the range of the simulated periscope target, the accuracy of the range measurements will be evaluated.

6.3.5 Swimmer Detection Test

The swimmer detection test shall consist of a surface diving team swimming on the surface of the water. The expected maximum detection range for the swimmers shall be estimated, based on modeled performance predictions and previous detection experience, and shall be used in planning the test runs. The swimmers will start the test beyond the expected maximum detection range and swim from a range patrol boat toward the STSTS during the predawn hours using the path shown in Figure 6-5. Target designation data shall not be given for this test. Upon commencement of each test run, the vendor operators shall attempt to detect and track the swimmers with their TIS. The vendor operators shall also attempt to determine the number of swimmers in the water.

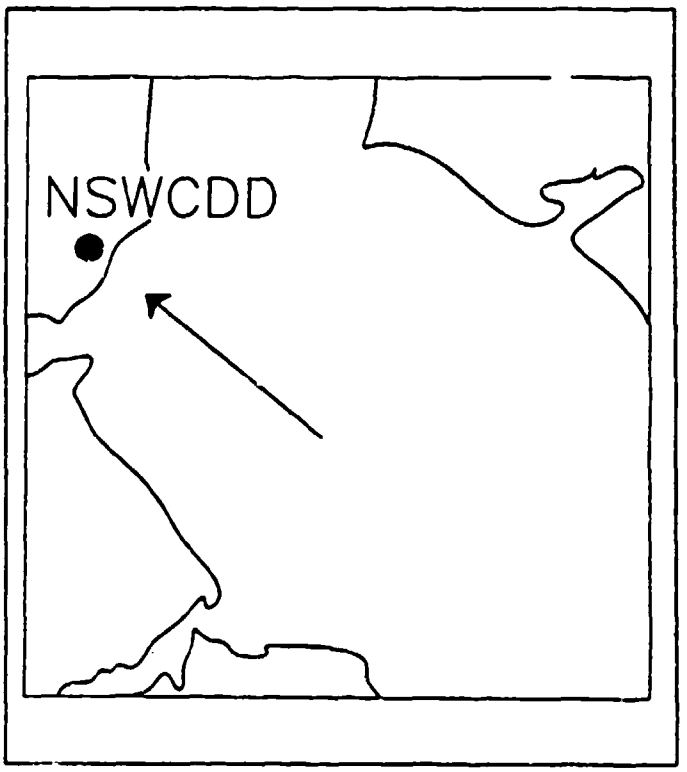

FIGURE 6-5. SWIMMER PROFILE

Instrumentation shall be started and data collected from the beginning of the test and will continue until the end of the test, as announced by the Test Conductor. Vendor operators shall verbally report swimmer detection as it occurs and the number of swimmers when it is determined. This data will be recorded on an audio track of the VCRs, along with NSWCDD observer comments. Time-tagged vendor system azimuth, elevation, and tracker data, as well as sensor video data, shall be collected throughout the test. Time-tagged, ground-truth target range, azimuth, and elevation data (referred to sensor location) shall also be collected throughout the test. Vendor operator target detection ranges and accuracies shall be determined by using time-tagged audio data, vendor system data, and ground-truth data. Firm track range capability will then be analyzed using the recorded tracker data.

6.3.6 Man-Overboard Detection Test

The man-overboard detection test shall consist of swimmers placed in the water next to a range patrol boat. The swimmers will take actions such as waving their arms in an effort to be more easily detected. Safety check-off sheets will be handed out to the units participating, and a PRTR area check will be conducted by swimming personnel during the previous evening. Decoy targets shall also be deployed floating on the surface of the water in the area where man-overboard detections will be performed. A possible scenario for this test could involve no men overboard with or without decoys deployed. The initial range of the swimmers will be determined based on modeled performance predictions. Depending on the results of previous swimmer deployments, the swimmers will be moved to different ranges (closer or farther away) and the test will be repeated to determine the maximum ranges at which the swimmers, simulating as men overboard, can be detected. Next, the whole process will then be repeated for swimmers remaining relatively still, with just their heads above the water. Target designation data shall not be given for the man-overboard tests. Upon commencement of each swimmer deployment, the vendor operators shall attempt to detect and track the swimmers with their TIS. The vendor operators shall also attempt to determine the number of swimmers in the water.

Instrumentation shall be started and data collected from the beginning of the test and will continue until the end of the test, as announced by the Test Conductor. Vendor operators shall verbally report swimmer detection as it occurs and the number of swimmers when it is determined. This data will be recorded on an audio track of the VCRs, along with NSWCDD observer comments. Time-tagged vendor system azimuth, elevation, and tracker data, as well as sensor video data, shall be collected throughout the test. Time-tagged, ground-truth target range, azimuth, and elevation data (referred to sensor location) shall also be collected throughout the test. Vendor operator target detection ranges and accuracies shall be determined by using time-tagged audio data, vendor system data, and ground-truth data. Firm track range capability will then be analyzed using the recorded tracker data.

6.3.7 Additional Events of General Applicability

The following items shall be applied to the various tests described, as applicable, or at the discretion of the Test Conductor.

6.3.7.1 Reliability, Maintainability, Availability, and Suitability. RMA, and suitability shall consist of thoroughly reviewing contractor-supplied R&M data (which is to be received prior to initiation of site preparation) and on-site evaluation R&M data collection taken throughout the evaluation and analysis of data. Vendors shall record and maintain records for all maintenance and faults as they occur during the evaluation. NSWCDD R&M engineers shall collect the records daily and query vendor engineering personnel on the contents. Vendors shall be required to maintain, and provide to NSWCDD, records of all corrective and preventive maintenance actions, maintenance times, and operational times associated with those actions that occurred during the test period. The data will be reviewed and updated, as necessary, to reflect the evaluation and an operational availability and suitability analysis will be conducted for inclusion into the EOSE final report.

6.3.7.2 Compatibility With U.S. Navy R&M Practices. Vendors shall be assisted in the conduct of the evaluation by NSWCDD R&M engineers who shall be on station in the operating area. These individuals are experienced U.S. Navy engineers, familiar with Navy procedures, practices, and system support documentation. They shall be tasked, as part of their responsibilities, to observe and provide written comment upon any and all features of the vendor systems that relate to compatibility with U.S. Navy R&M standards and practices.

6.3.7.3 System Safety. The Test Conductor shall arrange pre-briefing of NSWCDD EOSE on-station assistants (i.e., technicians and data reduction assistants stationed with vendor systems) by the Safety Division, to make them aware of potential hazards and other system safety matters that should be observed during the evaluation. These individuals shall be tasked, as part of their responsibilities, to observe and provide written comments on system safety.

6.3.7.4 Environmental Considerations. Military systems are developed to meet certain environmental standards to be able to withstand factors such as wind, rain, temperature, humidity, solar radiation, salt fog, etc. Recorded fault and failure data plus recorded observations of NSWCDD on-station personnel shall be analyzed to gain a preliminary assessment of vendors' systems' compliance with environmental standards.

6.4 TEST EVENTS VS. OBJECTIVES

A matrix showing which tests apply to specific objectives set forth in Section 4.0 are provided in Table 6-1.

TABLE 6-1. TEST EVENTS VS. OBJECTIVES

Objectives	Paragraph No.	Relevant Evaluation Events
P1: Detection Range Capabilities	6.3.1 6.3.2 6.3.3 6.3.4 6.3.5 6.3.6	Air Target Tests Surface Target Tests Floating Target Tests Periscope Detection Tests Swimmer Detection Tests Man-Overboard Detection Test
P2: Times Required to Establish Firm Track	6.3.1 6.3.2	Air Target Tests Surface Target Tests
P3: Firm Track Range Capabilities	6.3.1 6.3.2 6.3.3 6.3.4 6.3.5 6.3.6	Air Target Tests Surface Target Tests Floating Target Tests Periscope Detection Tests Swimmer Detection Tests Man-Overboard Detection Test
P4: Tracking Accuracy	6.3.1 6.3.2	Air Target Tests Surface Target Tests
P5: Recognition Range Capabilities	6.3.2 6.3.3	Surface Target Tests Floating Target Tests
P6: Track Continuity During Mode Changes	6.3.1 6.3.2	Air Target Tests Surface Target Tests
S1: RMA	6.3.7.1	RMA and Suitability
S2: Compatibility with U.S. Navy Maintenance Procedures	6.3.7.2	Compatibility with U.S. Navy Practices
S3: Suitability for U.S. Naval Fleet Operations	6.3.7.1	RMA and Suitability
S4: System Safety and Hazard Levels	6.3.7.3	System Safety
S5: System Maturity	6.3.7.1 6.3.7.2 6.3.7.4	RMA and Suitability Compatibility with U.S. Navy Practices Environmental Considerations
S6: Track Continuity in the Presence of Maneuvers	6.3.1	Air Target Tests

7.0 DATA COLLECTION, REDUCTION, ANALYSIS, AND REPORTING

7.1 DATA COLLECTION

NSWCDD shall collect all data required to meet the objectives in Section 4.0 of this plan. NSWCDD shall employ a combination of data collection and recording methods including hard-copy test logs, TV format video recordings, and digital data recordings of data extracted from the vendor systems.

7.1.1 Time Correlation of Data

Each data recording medium shall have provisions for recording the time of test events. For hard-copy test logs, the time will be entered manually. All other media will have time recorded automatically. To ensure that all data can be correlated after the test, a common time source shall be used for all data. This common time source shall be the master range clock distributed to STSTS users by NSWCDD's Range Instrumentation Group.

7.1.2 Media Identification

A unique identification and serial number shall be assigned to all media used in the evaluation to permit its ready identification by test event and vendor.

7.1.3 Data Retention

All test data shall be stored in an area appointed for evaluation data. The Test Conductor must give prior permission before data can be removed from the immediate area.

7.1.4 Specific Data Collection Requirements

7.1.4.1 Hard-Copy Data. Hard-copy data shall document static or infrequently changing variables. As a minimum, the following information shall be included in the hard-copy data.

- Test event title, number, date, and time
- Name of individual filling out data sheet and assigned station
- List of personnel participating in each test event, including assigned duty stations
- Target type and configuration
- Environmental data listed in Table 7-1 obtained from test personnel and NSWCDD range instrumentation
- Test data not subject to automatic collection
- Configuration of the vendor equipment including any changes incorporated since the previous test
- Unique identification numbers of all magnetic video, audio, digital, and other tapes and data media used during the specific test period

TABLE 7-1. ENVIRONMENTAL DATA

Data Item	Rate
Range Time Tag	Each Measurement
Cloud Cover	Pre/Post Test
Sea State (River State)	Pre/Post Test
Visibility	Every Minute
Air Temperature	Every Minute
Relative Humidity	Every Minute
Dewpoint	Every Minute
Air Pressure	Every Minute
Surface Wind Speed	Every Minute
Surface Wind Direction	Every Minute

7.1.4.2 Video Data. Identical TV format video tape recorders shall be used to record the video image and symbology presented to the operators. In addition, the raw video (no symbology) from a single TIS and a single TV camera per vendor shall be recorded.

7.1.4.3 Digital Data. Digital data from the vendors' systems and selected STSTS equipments shall be recorded. Table 7-2 lists the minimum set of data parameters to be collected from the vendor systems. Additional data parameters can be added, up to the limit of NSWCDD data recording equipment, by mutual agreement between the vendor and NSWCDD. Table 7-3 lists the set of data parameters to be collected from the STSTS facilities during testing.

TABLE 7-2. E-O SYSTEM DATA

Data Item	Rate
Range Time	Each Data Block
Target Position Range Azimuth Elevation	At System Rate
Target Position Rate Range Rate Azimuth Rate Elevation Rate	At System Rate
Target Designation Data Azimuth Elevation Range	At Input Rate
System Status	At System Rate
Sensor LOS Azimuth Elevation	At System Rate
Video Tracker Azimuth Off-Boresight Value Elevation Off-Boresight Value Tracker Status	At Video Tracker Rate
Laser Rangefinder Slant Range Range Gate Status	Each Laser Ranging Attempt
Operator Status Switch Settings Modes	Periodic or Aperiodic

7.1.4.4 Audio Data. STSTS communications will be conducted over the STSTS public address (PA) system and a sound powered phone (SPP) system. The PA system will be used by the Test Conductor to relay information that is pertinent to all test personnel. The SPP system will be used by the Test Conductor when private communications with a particular vendor or NSWCDD test personnel is required. All Test Conductor voice communications will be recorded on an audio channel of the multiplex video VCR. The SPP communications between the Test Conductor and each vendor, along with system operator comments, will be recorded on an audio channel of one of that vendor's dedicated VCRs.

TABLE 7-3. STSTS DATA

Data Item	Rate
Range Time	Each Data Block
Target Designation Data Data Sources Range Azimuth Elevation	Same as Input to the Vendor Systems
Test Conductor's Laser Safety Switch Status	At Instrumentation Rate

7.2 DATA REDUCTION

7.2.1 Quick-Look Data Review

Quick-look data reduction shall include the following activities.

7.2.1.1 Verification of Data Integrity. Magnetic and other machine-readable media shall be spot checked to ensure that data were recorded and that the recorded data can be recovered and played back. Data shall be examined to verify that the parameters specified in the plan and/or the evaluation procedures were actually recorded on the media.

7.2.1.2 Display of Data. A predefined list of parameters shall be converted to engineering units and/or plotted in graphical form, as appropriate, to verify proper system operation during the test event. The data display will include a standard parameter list and a limited number of additional parameters that may vary from test event to test event, or that may be related to a specific problem or uncertainty in equipment performance. Unless specifically requested by the Test Conductor, a data sampling rate of 1 Hz (or less) shall be used.

7.2.1.3 Schedule. Quick-look data shall be available, for the tests just completed that day, not more than 12 hr after completion of the last scheduled test. As a goal, it is desired that quick-look data be available within 6 hr of the completion of a test. Rapid availability of quick-look data is essential if problems with data recording equipment and/or the vendor systems are to be detected promptly and corrected prior to commencement of the next scheduled test.

7.2.2 Indepth Data Reduction

Indepth data reduction is the conversion of data from the recorded format to a format suitable to support data analysis. This may include conversion into engineering units, graphing the data versus time or another test parameter, or the ordering and/or consolidation of data, perhaps from several media, into matrices or arrays suitable for further processing by data analysis software. It is expected that all parameters required by NSWCDD to be collected will be reduced and used to determine achievement of evaluation objectives. Data reduction for all systems shall be completed within 30 days after completion of testing.

7.3 DATA ANALYSIS

The data analysis process shall take the reduced data provided by the indepth data reduction process and further process that data to produce statistical results, graphs, tables, and numerical summaries from which meaningful conclusions can be drawn with respect to the evaluation objectives defined in Section 4.0 of this plan. The data analysis process shall include the drawing of conclusions from the processed data and the preparation of material suitable for inclusion in an evaluation report. Data analysis for each system will begin as soon as appropriate portions of reduced data become available and shall be completed within 45 days of test completion.

Data analysis shall be directed by NSWCDD. Modeling will be performed on the vendor visible and thermal sensors against the targets used in the evaluation to determine range performance predictions. These predictions of range performance will be used to deploy target resources for particular test events at approximate ranges at which tasks should be performed. Performance characterization will be accomplished using the information obtained from the vendors. The range to the horizon and target obscuration caused by the horizon will be considered. Also, spatial frequencies of particular targets and the tasks to be performed (detection, classification, and recognition), target contrast, and environmental effects on contrast, target signature, and transmission will be used to predict range performance. Estimation or measurement of target/background visible contrasts and thermal temperature differences will be made. Weather data collected during the test events will be used to determine the atmospheric transmission effects for the thermal and visible sensors. Data collected on wind speed and sea state will be analyzed as to their effects on mine and periscope target signatures.

Other empirical data that will be used in the data analysis effort to produce a measure of system performance effectiveness are as follows:

- Time required to successfully perform the detection task for mines, periscopes, swimmers, and men overboard
- Laser rangefinder performance for all targets but the swimmers and men overboard
- The length of time to establish firm track and tracking accuracy when given a surface or air target designation
- Firm track range capabilities
- Track continuity in the presence of maneuvers for air targets
- Track continuity during mode changes
- Recorded system video and digital data

Also as a result of these tests, assessments will be made to determine the sources of errors. Generally, the areas to be considered are sensor related, target and weather related, and observer related. Target and weather errors are systematic errors that can be assessed for an individual test event; i.e., variations will affect all sensors equally. Sensor-related and observer-related errors during data collection will be assessed as trends during the data analysis.

7.4 EVALUATION REPORT

7.4.1 Preparation Responsibility

The results of the evaluation shall be documented in a report describing objectives, methodology, and evaluation results. NSWCDD shall have responsibility for the preparation of the report.

7.4.2 Report Participation

All vendors in the evaluation are encouraged to provide comments, data, and conclusions to the Test Conductor for consideration in preparation of the report. Such information may or may not be included in the report at the Test Conductor's discretion. If included, the Test Conductor may mark the material as being furnished by a specific vendor.

7.5 EOSE PROJECT REPORT

The results of the evaluation will be used in the preparation of a final report of the entire EOSE program. Copies of the EOSE Project Final Report will *not* be distributed to evaluation vendors.

8.0 SAFETY

8.1 NSWCDD RANGE SAFETY

8.1.1 Safety Briefing

NSWCDD shall provide a verbal safety briefing and a written summary to each vendor's evaluation team. It shall be the responsibility of each vendor team leader to ensure that all new or transient personnel who may join the team during the test period are fully briefed during their first work period at NSWCDD.

8.1.2 Briefing Summary

The NSWCDD brief shall summarize overall range personnel access and safety signs, procedures, warning lights, and shelter locations. In addition, the brief shall address STSTS unique safety and access requirements.

8.1.3 Compliance Failures

Failure to comply with range and STSTS safety, security, or access requirements may result in the responsible individual or group being denied access to the STSTS and/or NSWCDD.

8.2 LASER SAFETY

8.2.1 Requirements

All EOSE personnel, including the vendors, shall comply with U.S. Navy and NSWCDD laser safety requirements. The requirements imposed upon each system shall be assessed on an individual basis based upon the parameters of the specific installed laser system. The Test Conductor is responsible for all laser emissions that occur; therefore, under no circumstances shall laser systems be used without prior approval from the Test Conductor. The following are minimum requirements that shall apply to all laser rangefinders. Additional requirements may be imposed if required.

8.2.2 NSWCDD Laser Safety SOP

A laser safety SOP shall be prepared by the Test Conductor and submitted to the NSWCDD Range Safety Director and to the NSWCDD Laser Safety Committee for review and approval. The NSWCDD laser safety SOP shall define the hardware, software, and procedural steps implemented at the STSTS to ensure safe operation of all lasers.

8.2.3 Laser Safety Glasses, Goggles, and Visors

Laser safety glasses, goggles, or visors must be worn by all personnel designated in the laser safety SOP during testing and maintenance that requires firing of a laser. The glasses, goggles, or visors are to protect the users' vision at the wavelengths emitted by the vendor systems. The minimum optical density required for the glasses, goggles, or visors will be approved by the NSWCDD Systems Safety Division. Prior to commencement of the testing, appropriate glasses, goggles, or visors shall be provided to operators and crew of test targets. This is to ensure that the laser protective equipment does not compromise the operator's ability to safely control the vehicle.

8.2.4 Laser Keyswitch

8.2.4.1 Keyswitch Implementation. A keyswitch shall be provided, which, in the off position, shall prevent any laser emissions from occurring—whether in normal operating mode or during maintenance.

8.2.4.2 Control of Keys. During the time the vendor equipment is at NSWCDD, all copies of the laser keyswitch keys shall be turned over to and remain in the control of the NSWCDD Test Director. No laser emissions shall occur without the prior knowledge and approval of the NSWCDD Test Director and Test Conductor.

8.2.4.3 Verification Procedure. Vendors shall provide a verification procedure, which will demonstrate and verify that laser safety switches function as intended and are not to be bypassed.

8.2.5 Laser Firing Cutouts

8.2.5.1 Cutout Implementation. Firing cutouts shall be implemented in the vendor's hardware and/or software to limit laser emissions to specifically approved LOSs. It is anticipated that these approved LOSs will be limited to portions of the NSWCDD PRTR. The specific laser cutout limits shall be defined and attached to this plan prior to commencement of testing.

8.2.5.2 Verification Procedure. Each vendor shall provide a procedure to verify the proper functioning and alignment of the cutouts implemented in the system. This procedure shall be followed at least once each day prior to any laser emissions and after any maintenance (corrective or preventive) or adjustments to any element of the system involved with implementation of the laser firing cutouts. For example, any maintenance or adjustment to the mechanical or electrical zero of a gimbal angle pick-off would require that the verification procedure be performed.

8.2.6 Laser Defeat Switch

8.2.6.1 Defeat Switch Implementation. An external defeat switch shall be provided for the NSWCDD Test Conductor that shall prevent any laser emissions from occurring—whether in normal operating mode or during maintenance.

8.2.6.2 Verification Procedure. Vendors shall provide a verification procedure that will demonstrate and verify that laser safety switches function as intended and are not to be bypassed.

8.3 OTHER HAZARDS

8.3.1 Hazard Briefing

Each vendor shall provide a verbal briefing and written supporting material to NSWCDD defining any other hazards in the system. This includes hazards such as high temperatures; rotating equipment; hazardous, flammable or toxic, cleaning materials; acoustical noise; electrical hazards; etc.

8.3.2 Hazard Control

Unless specifically authorized by NSWCDD, such hazards shall be controlled in accordance with established U.S. Navy or Occupational Safety and Health Administration requirements.

8.4 RADIO FREQUENCY EMISSIONS

No emissions from radios, radars, lasers, or other devices shall be initiated unless such emissions have received prior approval from NSWCDD. This includes portable radio transmitters such as citizen-band walkie-talkies, car radio telephones, cellular telephones, search radars, track radars, and laser rangefinders (whether considered eye hazardous or not). This restriction is imposed because of the STSTS' proximity to ammunition handling and storage areas associated with NSWCDD's gun firing activities.

8.4.1 Method for Obtaining Approval

Requests to use range radios, radar, or laser emitters shall be submitted to the NSWCDD EOSE Program Manager for each emitter. The requests must be submitted in writing 60 days prior to the tests and shall include the following information.

- Proposed operating location
- Operating frequency (or frequencies or frequency band)
- Peak and average operating power
- Antenna gain
- Antenna type (omnidirectional, parabolic, etc.)
- Other information pertinent to assessing the emitter (presence of cutouts limiting emissions to specific angular zones, restrictions on time of day in which emissions will occur, etc.)

8.4.2 Compliance With Approval

It shall be the responsibility of the organization that requests the approval for the emitter to comply with any and all restrictions imposed by NSWCDD upon the use of the emitter at NSWCDD.

9.0 SECURITY REQUIREMENTS

9.1 CLASSIFIED MATERIAL

9.1.1 Classification

All data and information written, recorded, or obtained as part of this evaluation, regardless of media, shall be marked, stored, disclosed, and transmitted following the appropriate security guidelines of the DoD, North Atlantic Treaty Organization, or the country in which the data originated, whichever is more stringent.

9.1.2 Classified Access

Personnel requiring access to classified areas, data, or material shall have an established need-to-know and an appropriate security clearance on file with NSWCDD. The NSWCDD EOSE Program Manager shall have primary responsibility for establishing need-to-know and need for access to various portions of the test area.

9.1.3 Distribution of Classified Data

No classified data shall be distributed to the vendors.

9.2 PROPRIETARY MATERIAL

9.2.1 Recording of Data

The instrumentation system used to collect data from each vendor's system will ensure that the data collected from any one vendor will not be recorded on the same disk and or video tape as another vendor's data, with one exception. The video recordings of the Test Conductor's multiplexed monitor will contain operator video from multiple vendor systems. This information shall not be reviewed by, nor distributed to, any of the vendors.

9.2.2 Segregation of Data

Throughout the data collection process, the data from each vendor shall be segregated from the data from any other vendor regardless of data medium. Data common to all vendors, such as weather data, will not be segregated. Any data from which the performance of a specific system can be determined will be segregated.

9.2.3 Physical Access to Equipment

There will be a physical separation of each vendors' proprietary equipment. Vendor personnel will be responsible for controlling access to their equipment. Attempts by representatives of one vendor to obtain access to proprietary data of another vendor may result in the offending individual and/or vendor being denied access to the STSTS and NSWCDD.

9.2.4 Base-Wide Contracts

NSWCDD has contracted out certain base-wide functions, such as cleaning and janitorial services and building and facilities maintenance. Unless the NSWCDD EOSE Program Manager is specifically requested by a vendor to deny access to such personnel, they shall be permitted normal access in accordance with their regular security clearances.

9.2.5 EOSE Specific Contracts

NSWCDD may contract for certain EOSE specific support. In general, contractors that may be considered by NSWCDD to provide EOSE support provide only engineering and related services and are not themselves end-item suppliers of E-O systems. If NSWCDD elects to contract for EOSE support, each vendor providing equipment for this evaluation will be informed of the proposed contract, the contractor's name, the nature of the business, and a summary of the proposed support requested by NSWCDD before the contractor's personnel arrive on site or the disclosure of any of the vendors' data to the contractor by NSWCDD. Disclosure of data and/or movement of the contractor's personnel at the STSTS will be limited based upon requests made by the vendors.

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13. ABSTRACT *(Maximum 200 words)*

This master plan is to be used as a basis for testing and evaluating to determine whether an electro-optical (E-O) tracking system containing a video tracker, television (TV) (daylight or low light level TV), a laser rangefinder, and a thermal imaging sensor is currently available and suitable for use in a variety of naval applications, including ship defense. The objective is to determine the degree to which an existing, non-developmental item E-O system can be used to support missions of U.S. Navy ships. Test events include air target, surface target, floating target, periscope detection, swimmer detection, man overboard, and additional events of general applicability.

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